NOAALink Technical Standards Profile

January 19, 2009

1. EXECUTIVE SUMMARY

NOAALink's Technical Standards Profile describes the NOAA Enterprise Architecture Committee's sub-committee (EACC) approved standards for each service area of NOAALink's Technical Reference Model (TRM). These standards were adopted to encourage and enable enterprise-wide interoperability, information exchange, and accessibility across NOAA and to extend them to industry business partners, stakeholders, and the public. These standards were developed for the following four TRM Service Areas and are fully documented in Section 7:

- Service Access and Delivery
- Service Platform and Infrastructure
- Component Framework
- Service Interface and Integration

The TRM is a component-driven, technical framework categorizing the standards and technologies to support and enable the delivery of Service Components and capabilities. It also unifies existing DOC and NOAA technical reference models and E-Government guidance providing a foundation to advance the reuse and standardization of technology through an established technical architecture. The objectives/drivers for creating this profile are to:

- Define usable technical standards across NOAA to improve collaboration in IT procurement and development of services between DOC agencies
- Promote NOAA-wide identification and utility of the IT standards
- Meet Office of Management and Budget (OMB) Circular A-130 requirements, for a viable TRM of services and associated IT standards
- Assist managers, planners, acquisition officials, and developers in the procurement of standard information technology products and services

The party responsible for producing this document is the Acquisition Architecture and Operations Contract Support (AAOCS) organization's Business Architecture Group (BAG), an integrated project team (IPT) chartered by the NOAA EAC. The AAOCS' BAG is comprised of NOAALink Contracting Officer Representatives (CORs) within NOAA.

The AAOCS relies upon the guidance of subject matter experts throughout NOAA, other government agencies, and IT industry organizations. The change and configuration management processes developed by the AAOCS enables updates to the standards profile and will occur as the AAOCS identifies changes published by official NOAA Technical Standards Profile standards bodies or receives official change requests from its stakeholders. This document and subsequent updates reside within the Service Registry standards repository (located at the AAOCS EA Sharepoint Portal).

2. FOREWORD: ONE NOAA ENTERPRISE VISION

As the demand for new information technology increases, so must the pace for standardizing these technologies. Successful standards result in compatible, interoperable, and integrated systems to support operations throughout NOAA. In order to achieve this goal, NOAA through the NOAALink Program must bring together standards applicable to its operations from many sources. This methodology is in direct support of NOAA's mission and vision as stated in NOAALink's IT Strategic Plan:

NOAALink's IT Mission: "To enable the mission of NOAA and to leverage information technology to steward services for citizens, government, and industry."

NOAALink's IT Vision: "Information technology that is secure; accessible; adds value across the enterprise; and exceeds customer expectations."

Office of Management and Budget (OMB) Circular A-130 requires that business needs justify technology. NOAALink's technical standards must accommodate the widest possible range of missions and scenarios by allowing stakeholders to enter the infrastructure at any time, any place, while protecting the privacy of individuals. Communications among DOC and NOAA, other government agencies, standards bodies, and the public are vital to the successful implementation and application of IT standards and adherence to the NOAALink IT Mission and Vision.

The NOAA enterprise is a coalition of Line Offices (LoBs) that collaborate to meet shared challenges while retaining the individuality that enables each one to accomplish its specialized mission. The NOAALink technical standards, in part, are intended to help move us all toward a unified "One NOAA."

3. ACKNOWLEDGEMENTS

A viable standards program relies on a broad base of participation and expert advice from many sources within government and the private sector. This initial standards profile was developed from a diverse confederation of NOAA LoBs, industry, business and IT stakeholders; federal agencies and advisors; and business partners and subject matter experts in the industry. The AAOCS will maintain contact with official standards bodies to stay informed of changes and rely upon the guidance of subject matter experts throughout the NOAA as well as from other government, private and industry organizations. The individuals listed below provided information, advice, and comments that contributed to the initial baseline of standards presented in the NOAALink Technical Standards Profile.

Technical Standards Profile Contributors:
(Redacted)
Name Organization
Role

4. INTRODUCTION

Driving each Federal agency's transition from a government-centric to citizen-centric business ideology is enterprise architecture (EA). As agencies struggle to understand and manage the relationship between their business and information technology (IT), EA is playing a major role in bridging that gap. Following the guidance of the Office of Management and Budget (OMB), General Accountability Office (GAO), the President's Management Agenda (PMA), and other regulatory government agencies, Federal institutions are looking to modernize their business by establishing and implementing an EA framework.

NOAALink’s AAOCS will be responsible for the technical standards that align to the technical architecture of NOAA’s EA framework. The AAOCS will collaboratively develop the technical standards that are discussed in this document. These standards guide decisions are related to IT investment alignment, planning, and procurement. AAOCS, will be established in FY2009, will work with NOAA’s EA Committee to provide the foundations, baseline analysis, guidance, and vision to guide NOAALink's technical standards development efforts.

The AAOCS in partnership with NOAA's EA form the governing body that centrally leads, manages, integrates, and coordinates efforts to identify and implement technical standards to support NOAA's enterprise as a whole.

The technical standards presented in this document represent a NOAA-wide effort and consensus on the standards supporting NOAALink's Technical Architecture. The standards represent the foundation on which NOAALink's target business architecture can be constructed to achieve interoperability NOAA-wide and extended to industry and business partners, stakeholders, and the public. NOAALink's target business architecture is based on the E-Gov Integrated Acquisition Environment (IAE).

4.1. Goals, Objectives, and Benefits

The AAOCS has identified a number of goals, objectives, and benefits related to the establishment of a NOAA-wide technical standards list.

Goals

The primary goals of establishing a NOAA-wide Technical Standards list are to:

- Provide NOAA cost savings via elimination or consolidation of duplicative processes, systems, and/or technologies, and improved integration
- Provide interoperability between processes, systems, LoBs, and agencies
- Improve consistency, accuracy, timeliness of information shared horizontally across the enterprise

These goals are consistent with the OMB direction, the NOAA Strategic Plan, Business Operations Manual and NOAALink's Business Strategic Plan.

Objectives

To comply with OMB guidance with technical standards development, NOAA must establish that the NOAALink technical standards are consistent with the OMB Federal Enterprise Architecture Model (FEA); ensuring continual information sharing through a common vocabulary and framework. Following this ideal, this document was developed with these objectives in mind:

- Ensure that NOALInk meets the requirements set forth in OMB Circular A-130, which calls for a viable TRM of services and set of IT standards to support the TRM.
- Provide the management, integration, coordination, and collaboration to promote NOAA-wide participation and consensus in the IT standards adoption and retirement process to maintain a viable set of actionable IT standards.
- Assist managers, planners, acquisition officials, IT professionals, those involved with procuring information technology products and services, and other interested parties in making informed judgments when choosing specifications to meet current and planned requirements.

Benefits

There are a number of benefits that will be realized as a result of developing an enterprise-wide technical standards list. These benefits will be recognized through the implementation of an EA driven portfolio management process that requires IT investment alignment to the developed technical standards list, resulting in improved IT investment management and procurement. In essence, new modular open systems will be designed to be flexible enough to evolve with changing industry and business trends and functional and technological requirements. Each of these benefits is described below:

- Improved integration between strategic business goals and IT functions will be realized, affording NOAA a better understanding of how IT supports the overall business strategy (e.g., simplified interoperability of IT investments through common technologies and standards).
- The reuse of technology is a key benefit to the creation and use of a technical standards list.
- Aligning NOAA LoB’s capital investments to the TRM leverages a common, standardized vocabulary, allowing interagency discovery, collaboration, and interoperability of technologies and standards. NOAA’s LoBs, DOC Agencies and the federal government will benefit from economies of scale by identifying and reusing the best solutions and technologies to support their business functions, mission, and target architecture.

- Strategic sourcing is another key benefit associated with an established enterprise-wide technical standards list. Integrating a technical standards list with the NOAALink contract vehicle will enable NOAA to realize the benefits associated with coordinated bulk technology purchases for DOC/NOAA.

4.2. Scope

This Technical Standards Profile integrates international, national, federal, industry, and other standards to provide an open systems environment with the functionality necessary to meet NOAA's broad range of mission requirements. These standards have been categorized based on the FEA TRM and are categorized in this document based on Service Areas. Each technical standard listed within the service areas represent the result of intensive NOAA-wide assessment and review to verify, update, replace, and retire standards. This document will evolve through NOAA-wide participation in the ongoing technical standards approval process. Ongoing adoptions, updates, and retirements of standards listed in this Profile will be reflected in the published version of this standards profile which will be hosted on the NOAALink Program’s Sharepoint Portal within the AAOCS standards repository. Additional information, including policy, publications, and the standards repository, will be published to the AAOCS section of the NOAA EAC’s documentation.

4.3. System of Record

The NOAALink Program is in the process of constructing an Enterprise Repository for Enterprise Architecture and related areas using the tool System Architect. System Architect is a client-server tool that provides a platform for decision support, analysis, standards compliance and communication. The Clinger-Cohen Information Technology Management Reform Act of 1966 section 5125 requires that agencies develop a sound and integrated information technology architecture. The Enterprise Repository/Service Registry provides assistance in the development of effective management processes and procedures for IT resources will help NOAA achieve and sustain a Green status rating for Enterprise Architecture and promotes the definition, specification and effective use of NOAA standards. The Enterprise Repository/Service Registry also improves return on investment, eliminates redundancy, improves decision making and promotes reuse.

The current deployment of the Repository/Registry has addressed the configuration of an initial operating capability supporting NOAA and Department-level modeling needs. This effort included population of Enterprise Architecture models with a scoped set of existing NOAA information (FEA reference model taxonomy) and IT asset information.

Further, it will enhance NOAA's ability to satisfy Office of Management and Budget Enterprise Architecture assessment criteria and support the four TOGAF architecture domains. NOAALink will apply The Architecture Development Method (ADM) to develop enterprise architecture to meet NOAALink's business and information technology requirements and improve internal management controls through increased visibility of IT applications. NOAALink plans to design and build the Repository/Registry with the business and technical structures necessary to meet OMB compliance specifications, extract business value and sustain relevant information over the long term. The implementation of the linkage between the repository/registry content and the technology standards defined jointly by the AAOCS BAG and EAC will enable decision makers to search for existing assets that support specific standards and to procure new IT assets that support those standards. This information will promote standards compliance in NOAA, reduce redundancy and provide better integration between IT systems. The Enterprise Repository/Registry will leverage NOAALink's standards and make them operational so that stakeholders can get accurate information about key areas and make effective decisions based on impact assessments.

5. NOAA TECHNICAL STANDARDS INITIATIVES

As this is the first major effort to establish enterprise-wide technical standards at the NOAA level, collaboration amongst LoBs is critical to the success of the technical standards initiative. The AAOCS BAG and EAC were formed with the specific purpose of addressing numerous and ongoing business/information technology alignment decisions as they relate to architecture, development, and procurement of technical services, products, and systems. The AAOCS BAG and EAC use the FEA framework to communicate the technical standards.

5.1. Purpose

The OMB Circular A-130 requires that technology justify business needs. The objective, now and in the long-term, of the AAOCS is to provide standards for an information architecture that can accommodate the widest possible range of missions and scenarios by allowing users to enter the infrastructure at any time, any place, while protecting the privacy of individuals. Communications among NOAA LoBs, other DOC agencies, standards bodies, industry business partners and the public are vital to the successful implementation and application of IT standards and adherence to the “One NOAA” IT Mission and Vision.

The Profile specifies the set of voluntary IT standards proposed to enable enterprise-wide interoperability, information exchange and accessibility across NOAA. These standards are categorized into service areas that align with the Technical Reference Model as specified by OMB Circular A-130 and modified by NOAA. This Profile provides guidance on the use of each standard. As the formal information architecture evolves, the AAOCS will continue to respond as follows.

- Facilitate the NOAA-wide use of a consistent set of IT standards.
- Provide mechanisms for tracking, adopting, and promulgating emerging IT standards to be included in future versions of the Profile.
- Conduct sunset reviews to continually update and refresh IT standards.
- Automate the NOAALink IT standards processes, to the extent possible, to expedite coordination and distribution of standards and guidance.
- Foster broad participation by NOAA stakeholders in voluntary standards bodies.
- The NOAALink Technical Standards Profile is intended to be a dynamic component of the enterprise architecture planning and development process that may serve as a valuable and integral tool for adopting and implementing new and effective IT standards across NOAA in support of strategic mission and business requirements.

5.2. Business and Architecture Drivers

The major drivers include the IT Strategic Plan and the OMB EA Assessment Framework.

The AAOCS is working towards defining a usable technical standards list across NOAA to improve the efficiency and effectiveness of each dollar spent towards IT within NOAA and across DOC agencies. This technical standards list's structure is based on the Federal Enterprise Architecture (FEA) Technical Reference Model (TRM) and contains custom extensions specific to NOAALink. Specifically, NOAALink's Business Architecture (BA) is a model of "what" NOAA's enduring function "do." NOAALink's BA is expressed as capabilities. Capabilities are discrete business function attributes that:

- Are measurable,
- Have properties, including inputs, outputs, service level metrics, owners and customer
- Include information about external stakeholders that interact with NOAA's business

NOAALink's BA focuses the operating model in business terms:

- Taxonomy of NOAA's business
- Improves understanding and communications
- Reduces ambiguity
- A whole view of NOAA's business
- Aligns NOAA's resources and investments that drive operational execution
- Facilitates understanding of NOAA's business issues, opportunities, relative priorities
- Allows evaluation of business value and performance at multiple levels
- Improves alignment of initiatives with the needs of NOAA's business
- Drives rational investments (e.g., initiatives & projects) and decision making
- A stable architectural foundation for managing change
- Capabilities or "what" NOAA's business does is a stable view of NOAA's business' enduring functions
- "How" business capabilities are implemented tend to change
- Implementation (People, Process, Technology) mapped to capabilities

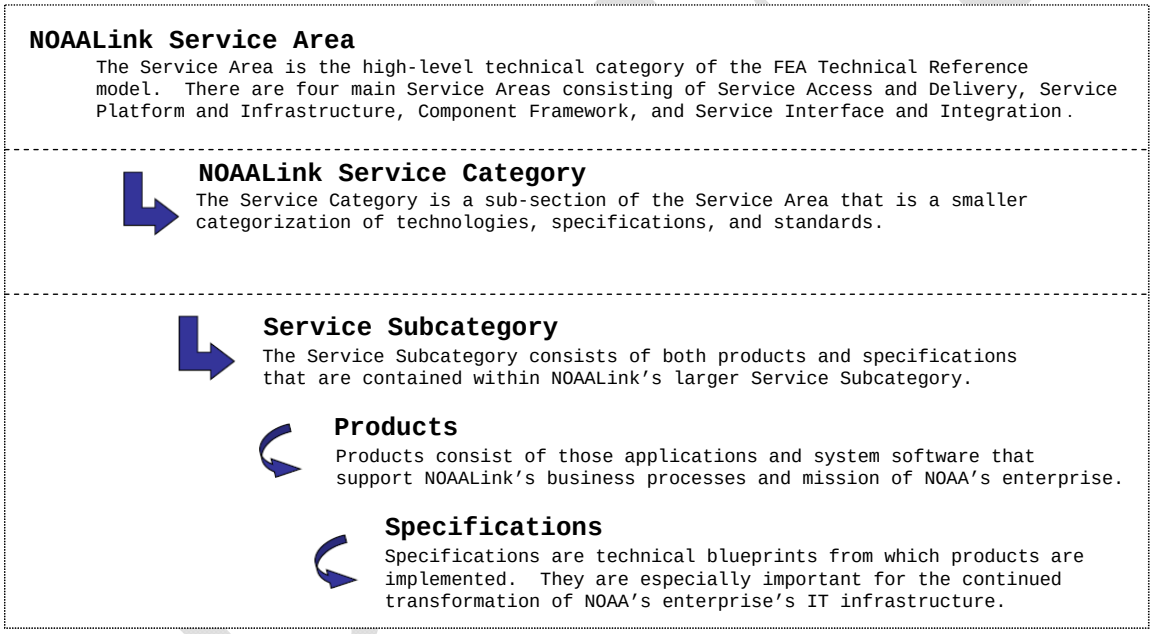
Appendix A provides a list of references for the regulatory and legislative bodies that are driving the push for the development of enterprise-wide technical standards within government agencies.

A list of additional drivers, both business and architectural, is listed in Appendix A.

5.3. Leveraging the Federal Enterprise Architecture (FEA) Framework

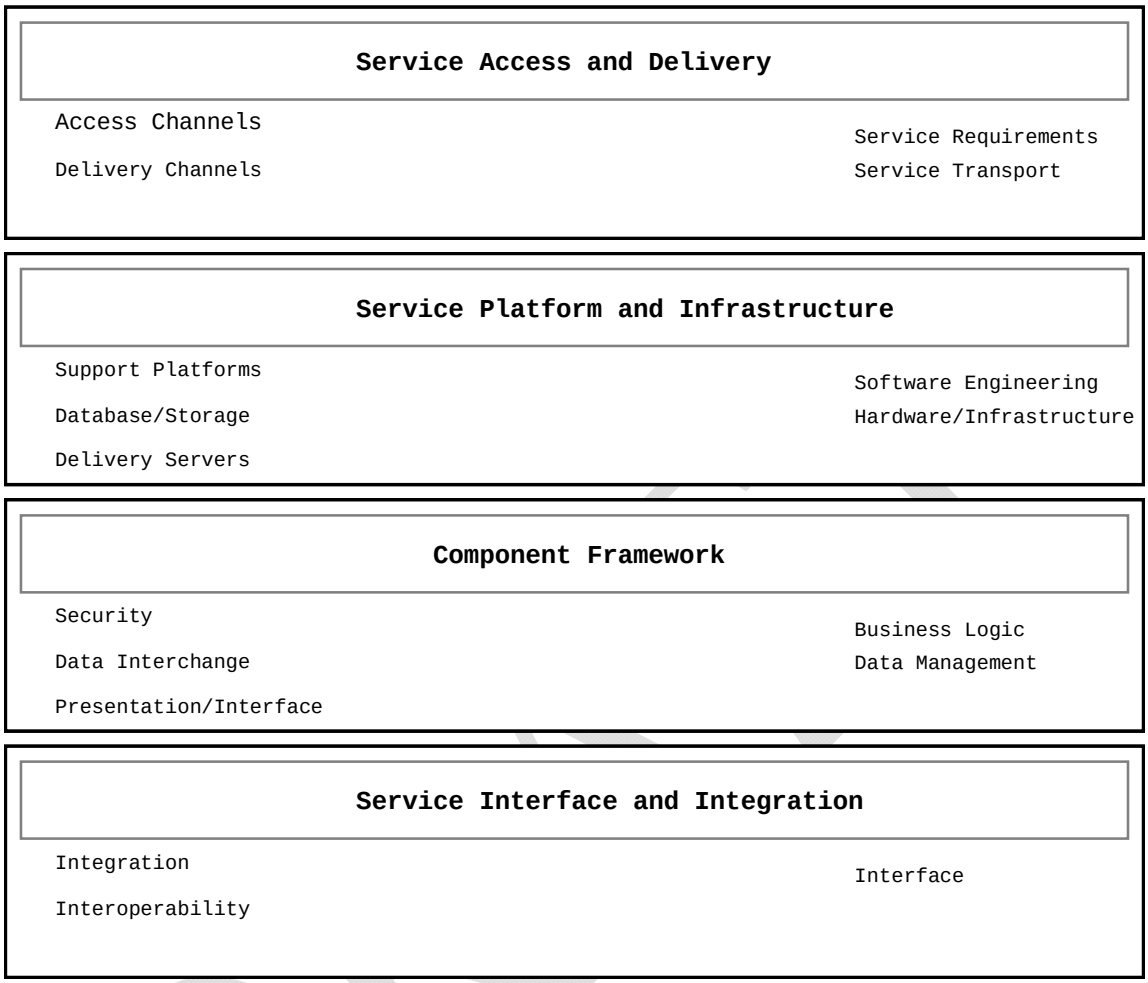
NOAALink's current Target TRM is displayed in Figure 1 below. The Product and Specification extensions of the Sub-category level are unique to NOAALink and are further discussed in the most current version of NOAALink's Target Technical Architecture document. NOAALink's target architecture is the NOAALink Integrated Acquisition Environment (NIAE)

Figure 1: NOAALink Technical Reference Model (TRM) Service Area



To further expand up the Target NOAA TRM Service Areas, Figure 2 below lists the Service Categories that are contained within each Service Area. The baseline NOAALink preferred standards list has been developed using this schema.

Figure 2: NOAALink TRM Overview



6. TECHNICAL STANDARDS ADOPTION PROCESS

After contract award the AAOCS will initiate its initial task to develop a repeatable process for approving and defining technical standards. This process is explained in the numbered bullets below:

1) The Requestor identifies the software or technology that is required to improve current business processes, functions, or the computing environment or identifies the need to extend the use of existing software or technology beyond the Phase Out date.

2) The Requestor completes the NOAALink Technical Standards Change Request Form for the requested software, specification, or technology.

3) Requestor must include a justification and/or business the case within Section B while including a Phase Out date for the requested standard. If the change request disallows other current requirements (security, etc.) to not be met, then the Requestor must complete the NOAALink Technical Standards Request for Waiver Form.

4) The Requestor submits the completed NOAALink Technical Standards Change Request Form to the AAOCS COR, NOAA LoB CIO, or Chief Architect. Upon review, the representative signs and submits the form, with all supporting documentation, to the AAOCS, and EAC.

5) The AAOCS and EAC review the submitted NOAALink Technical Standards Change Request Form and determine whether the request is complete. If incomplete the AAOCS or EAC may contact the requestor to obtain additional information and present feedback.

6) All recommendations for the change request to be approved are submitted to the AAOCS and EAC for review and approval. The status of all change requests and standards approval will be accessible via the NOAALink Program's Sharepoint Portal.

7) The AAOCS and EAC will determine the impact of the change request on the existing NOAA Enterprise Architectures. If it is determined that a waiver must be issued for but not limited to security or performance requirements, the affected NOAA LoB representative will be asked to submit the NOAALink Technical Standards Request For Waiver Form.

8) The AAOCS and EAC will also determine whether the information is sufficient to make a proposal to the CIO Council. If the AAOCS and EAC determine that the information is insufficient, the AAOCS and EAC will request that additional research be conducted to compare the technology with other technologies of similar capability. The AAOCS and EAC will assign an appropriate individual to conduct the market research. The requester, or designate, will present the findings along with the completed research to the AAOCS and EAC for review and consideration.

9) Upon review by the AAOCS the EAC engages configuration management process for standards through the System Architect EA repository tool.

The corresponding System Architecture model containing the FEA TRM taxonomy is updated to include the requested software, specification, or technology and a Control Number is assigned.

10) The Control Number will be used for tracking the request through the AAOCS, EAC, and NOAA CIO Council. The reason(s) for approval/denial of both change and waiver requests is documented by the NOAA CIO Council on the respective forms. A designated AAOCS, EAC, CIO Council member, and NOAA CIO must sign each form authorizing recommended approval.

11) The EAC notifies the Requestor of approval/disapproval and updates the Technical Reference Model (TRM) within the enterprise repository tool. The AAOCS maintains the original NOAALink Technical Standards Change Request Form and/or NOAALink Technical Standards Request for Waiver Form and forwards a copy to the requestor/user.

Rules
Any rules specific to the development of the NOAALink Technical Standards can be found in the AAOCS charter. This charter explains the roles, responsibilities, and general information of the AAOCS and is actively adhered to.

6.2. Criteria
General decision criterion was created during the development of the approval process. Each of the decision criterion and its supporting rationale are described below.

Decision Criterion

Decision 1
- Criterion: Must meet the organization's requirements and business drivers/goals
- Rationale: A standard must meet business requirements and not be based on technological advancement alone. A business need for cost-savings would drive the adoption of certain standards that may allow for integrating existing systems to implement the solution. The standard messaging solution, for example, would not be based solely on whether it’s the latest, innovative solution, but on the functionality and availability of the standard. In addition, NOAALink will develop standards for those elements of the technical infrastructure that affect all LoBs.

Standardization should not happen for its own sake but because it makes good business and technical sense for each of the LoBs. The enterprise standard should represent a lowest common denominator for shared capabilities below which all LoBs agree not to fall.

Decision 2

- Criterion: Must meet federal mandates
- Includes: Section 508, IPv6, and other mandates
  May include certification or internationalization, as appropriate.
- Rationale: A standard must meet all federal mandates in order to align with congressional goals and allow for smoother transitions for future modernization activities. NOAA should decline to implement a "best practice" or other "guidance" even though it may outweigh a federal mandate. For example, the Section 508 mandate must be adhered to in order for agencies to provide access to all individuals.

Decision 3

- Criterion: Should be a publicly available specification and developed and approved through a public standards body
- Rationale: A standard's specification should be publicly available to ensure transparency. There should be no questions regarding the origin, contributors, and availability of each standard. The use of open, public, specifications ensure integration with other systems adhering to those specifications. In addition, standards should originate from both well-known standards bodies made up of representatives from various industries and experience and a significant number of vendor representatives who have a variety of divergent interests. This will ensure that the appropriate people are constructing the most relevant and agreed upon problem solving methods. The standard must have been created by one of the body's referenced on the NSSN.org site or by one of the following:

- Accellera
- FAI
- IETF
- ASTM International
- GGF
- ISO

- AUTOSAR
- GS1
- ITU
- BIPM, CGPM, and
- IBTA
- ITU-R CIPM
- CableLabs
- IEC
- ITU-T
- Ecma International
- IEEE
- ITU-D
- Liberty Alliance
- N3P
- OASIS

Decision 4

- Criterion: Should be stable and supported by a range of readily available products, technologies, specifications includes cost and viability to the organization
- Example: Financial impact of Active Directory vs. LDAP
- Rationale: A standard should be implemented by a host of available products on the market, including both open-source or proprietary vendor solutions. It should be stable and not an unproven new specification without proper vendor support. There should be enough products that implement a protocol available in the marketplace to avoid being “locked in” to a single vendor. Adopting a brand new specification can incur unnecessary risks to the operating environment.

Decision 5

- Criterion: Should be well understood, mature technology
- Should be in final stage, not alpha or beta
- Rationale: A standard should be open, available, and have gone through multiple revisions for maturity. This will ensure stability and bug fixes. Furthermore, “well-understood” and “mature” would be assessed by each NOAA LoB in accordance with its own perceptions. This determination applies to both products as well as underlying specification(s).

Decision 6

- Criterion: Should be testable, so that components or products can be checked for conformance

- Certification and standards compliance through vendor
- Rationale: A standard must have test suites so that all products that implement the specifications can be certified to have implemented them correctly. This ensures more flexibility in procurement decisions around certified products. This will not always apply to those open source products that can't afford expensive test suites for certification. Further internal review and possible testing may have to be conducted to ensure compliance with the specification. A LoB may use whatever evidence of testing it regards as necessary or sufficient to establish confidence in that product or specification.

Decision 7

- Criterion: Should support internationalization
- Rationale: A specification must have the facility to support multiple languages and character sets to adapt to citizen and employee needs if a LoB determines that a business case supports it. This will ensure further flexibility in the system support for various stakeholders.
- Any internationalization mandates must be adhered to as well in order for the federal government as a whole to ensure that citizens of different linguistic origin can fully understand federal benefits, laws, etc.

Decision 8

- Criterion: Should not introduce any regressions that would have serious implications/limitations for ongoing support of an organization's environment
- Emphasis on interoperability
- Rationale: A standard should not introduce regressions in the overall operating and business environment once it is deployed. Various systems will be required to be shutdown and migrated, but the supported business should not change due to the introduction of a new standard.

Decision 9

- Criterion: Should be in wide use, i.e. de facto standard
- Rationale: A standard should be in wide-use and implemented across the industry. It's important to determine what specifications others are implementing so that the agency can ensure compatibility with other technologies and organizations.

7. TECHNICAL STANDARDS

The NOAALink Technical Standards Profile is organized into four information technology architecture service areas, reflecting the components of the Technical Reference Model (TRM) necessary to build a complete technical infrastructure. The Standards Profile reflects the initial baseline standards currently adopted in each of these areas. The Standards Approval Process provides the vehicle for continually refreshing the standards in each service area. The sunset review provides an overall review of standards and an opportunity to set future direction. Service areas can be re-defined as the standards process evolves. The most important consideration is the need to accurately reflect information technology (IT) standards that support current requirements and future trends in defining NOAA's IT architecture.

7.1. Service Access and Delivery

As stated by the Federal Enterprise Architecture (FEA) in the Consolidated Reference Model, “the Service Access and Delivery Service Area defines the collection of Access and Delivery Channels that will be used to leverage the Service Component, and the legislative requirements that govern its use and interaction.” The Service Access and Delivery service area consists of four service categories, Access Channels, Delivery Channels, Service Requirements, and Service Transport.

7.1.1. Access Channels

The FEA states that access channels “define the interface between an application and its users, whether it is a browser, personal digital assistant or other medium.”

The standards that comprise the Access Channels subcategory are shown in Figure 5 below.

Figure 5: Service Access and Delivery – Access Channels

Service Subcategory	Specification / Technology	Standard
Collaboration Communications	Electronic Mail (E-mail)	Extended SMTP (ESMTP)
		Secure / Multipurpose Internet Mail Extensions (S/MIME)
		Simple Mail transfer Protocol (SMTP)
	Facsimile (Fax)	ITU-U Recommendations: T.6, T.30,T.60, T.61, T.62, T.62bis, T.70, T.72, T.73, T.503, T.521, T.563, and F.161

Service Subcategory	Specification / Technology	Standard
Other Electronic Channels	Markup Languages	Extensible HyperText Markup Language (XHTML)
		HyperText Markup Language (HTML)
	Voice Protocols	Session Initiation Protocol (SIP)
	Web Services	Asynchronous Service Access Protocol (ASAP)
		Business Process Execution Language (BPEL)
		DIME
		EbXML
		Extensible Markup Language (XML)
		Security Assertion Markup Language (SAML)
		Simple Object Access Protocol (SOAP)
		SOAP Message Transmission Optimization Mechanism (SOAP MTOM)
		Universal Business Language (UBL)
		Universal Description, Discovery, and Integration (UDDI)

		WS-*
	Web Services - IM/Web Chat	Extensible Messaging and Presence Protocol (XMPP)
		IRC
		Protocol for SYnchronous Conferencing (PSYC)
		Session Initiation Protocol for Instant Messaging and Presence Leveraging Extensions (SIMPLE)
		Wireless Village (WV)
Web Browser	Browser	DHTML
		Extensible HyperText Markup Language (XHTML)

7.1.2. Delivery Channels

Delivery channels define the level of access to applications and systems based upon the type of network used to deliver them, as stated by the FEA. The delivery channel standards are shown in Figure 6 below.

Figure 6: Service Access and Delivery: Delivery Channels

Service Subcategory	Specification / Technology	Standard
Extranet	World Wide Web (WWW)	Dynamic HTML (DHTML)
		Extensible Markup Language (XML)
		HyperText Markup Language (HTML)
		Simple Object Access Protocol (SOAP)
		Universal Description, Discovery, and Integration (UDDI)

Service Subcategory	Specification / Technology	Standard
Web Services Description Language (WSDL)		
Internet	World Wide Web (WWW)	Dynamic HTML (DHTML)
		Extensible Markup Language (XML)
		HyperText Markup Language (HTML)
		Simple Object Access Protocol (SOAP)

		Universal Description, Discovery, and Integration (UDDI)
		Web Services Description Language (WSDL)
Intranet	World Wide Web (WWW)	Dynamic HTML (DHTML)
		Extensible Markup Language (XML)
		HyperText Markup Language (HTML)
		Simple Object Access Protocol (SOAP)
		Universal Description, Discovery, and Integration (UDDI)
		Web Services Description Language (WSDL)
Peer to Peer (P2P)	Peer to Peer	JXTA
		Simple Object Access Protocol (SOAP)
Virtual Private Network (VPN)	Hybrid VPN - Secure/Trusted	IPSec
		Layer 2 Tunneling Protocol (L2TP)
		Secure Sockets Layer (SSL)
		Transport Layer Security (TLS) Protocol

7.1.3. Service Requirements

The FEA states that the service requirements category defines the necessary aspects of an application, system or service to include legislative, performance, and hosting. The standards developed for the service requirements category are listed in Figure 7 below.

Figure 7: Service Access and Delivery – Service Requirements

Service Subcategory	Specification / Technology	Standard
Authentication / Single Sign-on (SSO)	Security	FIPS 201
		Kerberos
		S/MIME
		Security Assertion Markup Language (SAML)
		X.509
		XML-Signature Syntax and Processing

Legislative / Compliance	Section 508	Electronic and Information Technology Accessibility Standards (EITAS)
	Security	FIPS 186

7.1.4. Service Transport

Service Transport defines the end to end management of the communications session to include the access and delivery protocols, as defined by FEA. The standards for the Service Transport subcategory are list below in Figure 8.

Figure 8: Service Access and Delivery – Service Transport

Service Subcategory	Specification / Technology	Standard
Service Transport	Transport	File Transfer Protocol (FTP)
		Internet Control Message Protocol (ICMP)
		IPv6
		RMI
		SSH File Transfer Protocol (SFTP)
		Transmission Control Protocol (TCP)
		User Datagram Protocol (UDP)
Supporting Network Services	Networking	Border Gateway Protocol Version 4 (BGP-4
		Directory Services (X.500)
		Domain Name System (DNS)
		Dynamic Host Configuration Protocol for IPv6 (DHCPv6)

Service Subcategory	Specification / Technology	Standard
Supporting Network Services	Networking	Extended SMTP (ESMTP)
		H.323
		Internet Message Access Protocol (IMAP)
		Lightweight Directory Access Protocol (LDAP)
		Multipurpose Internet Mail Extensions (MIME)

		Simple Mail Transfer Protocol (SMTP)
		SNMP v3.0
		T.120
		Active Directory (Local Security Authority)
		Server Message Blocks (SMBs)

7.2. Service Platform and Infrastructure

The Service Platform and Infrastructure Service Area define the collection of platforms, hardware and infrastructure standards that enable Component Based Architectures and Service Component reuse, as defined by FEA. The subcategories that comprise the Service Platform and Infrastructure service area are: Support Platforms, Delivery Servers, Software Engineering, Database / Storage, and Hardware / Infrastructure. Each of the standards for these subcategories is listed below.

7.2.1. Support Platforms

Support platforms are hardware or software architectures. The term originally dealt with only hardware, and it is still used to refer to a CPU model or computer family. The standards for this subcategory are listed in Figure 9 below.

Figure 9: Service Platforms and Infrastructure - Support Platforms

Service Subcategory	Specification / Technology	Standard
Platform Dependent: Application Support Platforms	Windows	Web Services
	Windows.Net	.NET Framework
Platform Dependent: Operating Systems	Windows	Windows Server 2008
		Windows XP
Platform Independent (Windows): Virtualization Platforms	Sharepoint	Microsoft Windows SharePoint Services virtual server
Platform Independent (Other): Virtualization Platforms	VMWare	VMware ESX Server
		VMware Workstation
Platform Independent: Application Support Platforms	Java 2 Platform Enterprise Edition (J2EE)	J2EE1.4
Platform Independent: Operating Systems	Linux	Linux

	Solaris	Solaris 10
Programming Languages	-	C#
		C/C++
		Java
		JavaScript
		Perl
		VBScript
		Visual Basic.NET
Wireless / Mobile	Java 2 Platform, Micro Edition (J2ME)	Java 2 Platform, Micro Edition (J2ME)

7.2.2. Delivery Servers

Delivery Servers are front-end platforms that provide information to a requesting application. It includes the hardware, operating system, server software, and networking protocols. The standards for this subcategory are listed in Figure 10 below.

Figure 10: Service Platforms and Infrastructure – Delivery Servers

Service Subcategory	Specification / Technology	Standard
Application Servers	Application Servers	BizTalk and Commerce Server Microsoft Services Business Architecture *See the Supporting Platforms service category of the Service Platform and Infrastructure service area.
Media Servers	Windows	Windows Media Services 2008
Portal Servers	Portal Server	Sharepoint *See the Business Logic service category of the Component Framework service area.
Web infrastructure	Windows	Windows Web Server 2008
Web Servers	Web Server	Hypertext Transfer Protocol (HTTP) 1.1

7.2.3. Software Engineering

Software engineering covers the technology associated with building software systems as well as technical solutions supporting management issues, such as testing, modeling and versioning. The TRM is concerned with component technical architecture, not engineering processes. The standards for this subcategory are listed in Figure 11 below.

Figure 11: Service Platforms and Infrastructure – Software Engineering

Service Subcategory	Specification / Technology	Standard
Integrated Development Environment (IDE)	N/A	N/A
Modeling	N/A	N/A

Software Configuration Management	N/A	N/A
Test Management	N/A	N/A
Enterprise Integration	N/A	N/A
Web Development	N/A	N/A
Open Source	N/A	N/A
Service Oriented Architecture	N/A	N/A
Green IT	N/A	N/A
Java	N/A	N/A

7.2.4. Database /Storage

Database / Storage refers to a collection of programs that enables storage, modification, and extraction of information from a database, and various techniques and devices for storing large amounts of data.

The standards for this subcategory are listed in Figure 12 below.

Figure 12: Service Platforms and Infrastructure – Database Storage

Service Subcategory	Specification / Technology	Standard
Database	RDBMS/DBMS	DB2
		Oracle
		SQL Server
Storage	NAS	CIFS
		EXT2/EXT3
		NTFS
	SAN	Fibre Channel
		iSCSI

7.2.5. Hardware / Infrastructure

This subcategory defines the physical devices, facilities and standards that provide the computing and networking within and between enterprises. The standards in this subcategory are listed in Figure 13 below

Figure 13: Service Platforms and Infrastructure – Hardware / Infrastructure

Service Subcategory	Specification / Technology	Standard
Embedded Technology Devices	N/A	N/A
Local Area Network (LAN)	Ethernet	802.3
	VLAN	IEEE 802.1Q
Network Devices / Standards	Firewall	* See TD P 85-01 and the Security category of the Component Framework service area.

	Gateway	N/A
	Hub	N/A
	Router	* See all technical standards specified in Local Area Network (LAN) and Wide Area Network (WAN) service subcategories of the service Platform and Infrastructure service area. * See all technical standards specified in the service Transport and Supporting Network Services subcategories of the service Access and Delivery service area.
	Switch	* See all technical standards specified in the Local Area Network (LAN) service subcategory of the Service Platform and Infrastructure service area. * See all technical standards specified in the Service Transport and Supporting Network Services subcategories of the Service Access and Delivery service area.
Peripherals	Printer	* See NOAALink Strategic Sourcing
	Scanner	* See NOAALink Strategic Sourcing
Servers / Computers	Enterprise Servers	Dell
		HP
		IBM
		Sun Microsystems
	Mainframe	IBM zSeries
Video Conferencing	Bridge, Codec, Receivers	H.323
	T.120	
Wide Area Network (WAN)	WAN	TCS (ATM)/TCE

7.3. Component Framework

The FEA defines the Component Framework service area as the underlying foundation and technical elements by which Service Components are built, integrated and deployed across Component-Based and Distributed Architectures. The subcategories that comprise this service area are: Security, Presentation / Interface, Business Logic, Data Interchange, and Data Management. The Component Framework subcategories and their respective standards are described below.

7.3.1. Security

The Security subcategory defines the methods of protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide integrity, confidentiality and availability, as defined by FEA. The standards for this subcategory are listed in Figure 14 below.

Figure 14: Component Framework - Security

Service Subcategory	Specification / Technology	Standard
Certificates / Digital Signature	-	CCP-PROF
		FIPS 140-2 - Security Requirements for Cryptographic Modules
		Internet IP Security Domain of Interpretation for ISAKMP
		Internet Key Exchange (IKE)
		Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List
		Keyed-Hash Message Authentication Code (HMAC)
Supporting Security Services	-	Certificate-Issuing and Management Components Family, Security Level 4 PP - Version 1.0

Service Subcategory	Specification / Technology	Standard
Supporting Security Services	-	Controlled Access Protection Profile - Version 1.d
		Domain Name System Security Extensions (DNSSEC)
		FIPS 113 - Data Authentication Algorithm (DAA)
		FIPS 180-2 - Secure Hash Standard (SHS)
		FIPS 185 - Escrowed Encryption Standard (EES)
		FIPS 186-2 - Digital Signature Standard (DSS)
		FIPS 197 - Advanced Encryption Standard (AES)
		FIPS 198 - Keyed-Hash Message Authentication Code (HMAC)
		FIPS 201 - Personal Identity Verification (PIV)
		FIPS 46-3 - Data Encryption Standard (DES)
		FIPS 81 - Data Encryption Standard (DES) Modes of Operation
		Intrusion Detection System (IDS) System Protection Profile - Version 1.5
		Intrusion Detection System Analyzer Protection Profile - Version 1.2
		Intrusion Detection System Scanner Protection Profile - Version 1.2
		Kerberos
		Secure Shell (SSH)
		Secure Sockets Layer (SSL) Protocol

Service Subcategory	Specification / Technology	Standard
Supporting Security Services	-	Security Assertion Markup Language (SAML) Version - 1.1
		Transport Layer Security (TLS) Protocol
		Web Services Security (WS-Security) - Version 1.0
		Secure Hypertext Transfer Protocol (HTTPS)

7.3.2. Presentation / Interface

This subcategory is defined by FEA as the connection between the user and the software, consisting of the presentation that is physically represented on the screen. The standards for this subcategory are listed in Figure 15 below.

Figure 15: Component Framework – Presentation / Interface

Service Subcategory	Specification / Technology	Standard
Wireless / Mobile / Voice	-	Wireless Markup Language (WML)
Content Rendering	-	ActionScript
		AJAX
		Cascading Style Sheets (CSS)
		Dynamic HTML (DHTML)
		Java Portlet API (JSR 168)
		Web Services for Remote Portlets (WSRP)
Dynamic / Server-Side Display	-	Active Server Pages .Net (ASP.Net)
		JavaServer Pages (JSP)
		Web Service User Interface (WSUI)
Static Display	-	eXtensible HTML (XHTML)
		HyperText Markup Language (HTML)

7.3.3. Business Logic

The Business Logic subcategory defines the software, protocol or method in which business rules are enforced within applications, as stated by FEA. The standards for this for this subcategory are listed in Figure 16 below.

Figure 16: Component Framework – Business **Logic**

Service Subcategory	**Specification / Technology**	**Standard**
Platform Dependent	Windows	Microsoft Services Business Architecture (MSBA)
Platform Independent	-	Enterprise Java Beans (EJB) 2.1 (JSR 153)
	Java Servlets	Java Servlet Specification 2.4

7.3.4. Data Interchange

FEA defines the Data Interchange subcategory as the methods in which data is transferred and represented in and between software applications. The standards for this subcategory are listed in Figure 17 below.

Figure 17: Component Framework – Data Interchange

Service Subcategory	**Specification / Technology**	**Standard**
Data Exchange	-	Dublin Core Metadata Standard
		ebXML
		FIXML
		Open Financial Exchange (OFX)
		Simple Object Access Protocol (SOAP)
		XML Metadata Interchange (XMI)

7.3.5. Data Management

The Data management subcategory is the management of all data/information in an organization. It includes data administration, the standards for defining data and the way in which people perceive and use it, as defined by FEA. The standards for this subcategory are listed in Figure 18 below.

Figure 18: Component Framework – Data Management

Service Subcategory	Specification / Technology	Standard
Database Connectivity	-	ActiveX Data Objects (ADO)
		ActiveX Data Objects Extensions for Data Definition Language and Security (ADOX)
		Distributed Relational Database Architecture (DRDA)
		Java Data Objects (JDO)
		Java Database Connectivity (JDBC)
		MDX
		OLE DB
		OLE/DB for OLAP (ODBO)
		Open Database Connectivity (ODBC)
		SQL*NET
		SQL:2003
		SQLJ
		Oracle PL/SQL
		Microsoft Transact SQL
Reporting and Analysis	-	CWM
		JOLAP
		OLAP
		XBRL
		XML/A
		XQuery

7.4. Service Interface and Integration

The Service Interface and Integration Service Area defines the discovery, interaction and communication technologies joining disparate systems and information providers, as stated by FEA. The Service Interface and Integration service area is comprised of three subcategories: Integration, Interoperability, and Interface. Each of the standards associated with these subcategories are described below.

7.4.1. Integration

The Integration subcategory defines the software services enabling elements of distributed business applications to interoperate, as stated by FEA. The standards for this subcategory are listed in Figure 19 below.

Figure 19: Service Interface and Integration - Integration

Service Subcategory	Specification / Technology	Standard
Enterprise Application Integration	Application Connectivity	Extensible Markup Language (XML)
		Java Message Service (JMS)
		JSR-170 (Content Repository API for Java)
		Simple Object Access Protocol (SOAP)
		ISO 15022
		.Net 3.0 Web Services
	Business Process Management	Business Process Execution Language (BPEL)
		BizTalk (SOA, ESB, B2B, RFID, adapters, etc.)
		Java Business Integration (JBI) (JSR 208)
	Transformation and Formatting	Cloud Computing
Middleware	.NET	.NET
	Data Warehouse	Common Warehouse Metadata Interchange (CWMI)
	Java 2 Platform Enterprise Edition (J2EE)	J2EE1.4
		Java EE Connector Architecture (JCA)
		Java Message Service (JMS)
		Java Naming and Directory Interface (JNDI)
	Other	Integrated Object Model (IOM)
		Java Business Integration (JBI) (JSR 208)
		WS-*
		XML-RPC

7.4.2. Interoperability

FEA defines the Interoperability subcategory as the capabilities of discovering and sharing data and services across disparate systems and vendors. The standards for this subcategory are listed in Figure 20 below.

Figure 20: Service Interface and Integration – Interoperability

Service Subcategory	Specification / Technology	Standard
Data Format / Classification	Data Format / Classification	eXtensible Access Control Markup Language (XACML)
		Extensible Markup Language (XML)
		XSL-FO
Data Transformation	Data Transformation	XPath
		XSLT

7.4.3. Interface

The Interface subcategory defines the capabilities of communicating, transporting and exchanging information through a common dialog or method, as stated by FEA. The standards for this subcategory are listed in Figure 21 below.

Figure 21: Service Interface and Integration - Interface

Service Subcategory	Specification / Technology	Standard
Service Description / Interface	Web Services	Web Services Description Language (WSDL)
Service Discovery	Discovery	Universal Description, Discovery, and Integration (UDDI)

APPENDICES

APPENDIX A: References

- The Federal Enterprise Architecture: http://www.whitehouse.gov/omb/egov/a-2-EAModelsNEW2.html

CES

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- The Federal Enterprise Architecture: http://www.whitehouse.gov/omb/egov/a-2-EAModelsNEW2.html
- The OMB EA Assessment Framework: http://www.whitehouse.gov/omb/egov/a-2-EAAssessment.html
- The OMB Circular A-130: http://www.whitehouse.gov/omb/circulars/a130/a130trans4.html
- The Clinger-Cohen Act: http://www.cio.gov/Documents/it_management_reform_act_Feb_1996.html
- New Priorities for the 21st Century – NOAA's Strategic Plan
- http://www.ppi.noaa.gov/PPI_Capabilities/Documents/Strategic_Plans/FY06-11_NOAA_Strategic_Plan.pdf
- Department of Commerce FY 2004-FY2009 Strategic Plan
- http://www.osec.doc.gov/bmi/Budget/Strategic04-1002.htm
- The NOAALink Target Technical Architecture: will be published on the NOAALink EA Resource Center Sharepoint Portal
- The Treasury IT Modernization Blueprint: will be published on the NOAALink EA Resource Center Sharepoint Portal

APPENDIX B: Standards Bodies

Many IT standards described in this document have been issued by official standards bodies, most of which maintain Web sites that provide additional information about activities, events, and other news of interest to the IT community. Following is a list of the standards bodies in this document that maintain Web sites.

- American National Standards Institute (ANSI) http://www.ansi.org/default.asp
- Comite' Consultatif International de Telegraphique et Telephonique (CCITT) (CCITT changed its name to International Telecommunications Union (ITU) in 1993.) http://www.itu.int/ITU-T/index.html
- European Computer Manufacturers Association (ECMA) http://www.ecma.ch/index.htm
- Electronics Industry Alliance (EIA) http://www.eia.org/

- Federal Telecommunications Standards Committee (FTSC) http://www.ncs.gov/n6/about/html/ftsc.htm
- International Electrotechnical Commission (IEC) http://www.iec.ch/
- Institute of Electrical and Electronics Engineers, Inc. (IEEE) http://standards.ieee.org/
- Internet Engineering Task Force (EITF) http://www.ietf.org/home.html
- International Organization for Standardization (ISO) http://www.iso.ch/
- International Telecommunications Union (ITU) http://www.itu.int/ITU-T/index.html
- National Information Standards Organization (NISO) http://www.niso.org/
- National Institute of Standards and Technology (NIST) http://www.nist.gov/
- Object Management Group (OMG) http://www.omg.org/
- Open Software Foundation (OSF) (OSF and X/Open have merged to form The Open Group.) http://www.opengroup.org
- Telecommunications Industry Association (TIA) http://www.tiaonline.org/standards
- United States Product Data Association (US PRO) https://www.uspro.org/
- World Wide Web Consortium (W3C) http://www.w3.org/Overview.html